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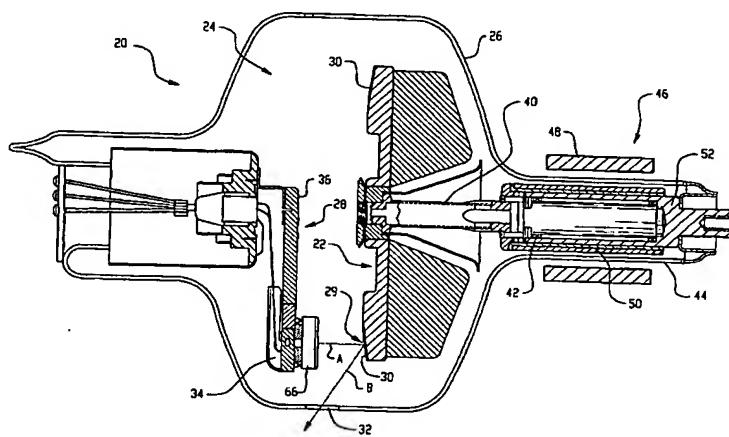
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[Continued on next page]

(54) Title: X-RAY TUBE CATHODE ASSEMBLY AND INTERFACE REACTION JOINING PROCESS



WO 2004/079762 A3

(57) Abstract: An x-ray tube cathode assembly (28) includes a support arm (36) comprising a first metal. A ceramic insulator (70, 82) has a first metalized surface (72, 86) wherein the metalized surfaces comprise a desired amount of the first metal. A first member of filler material (90) is in contact with the support arm (36) and the first metalized surface (72, 86) of the ceramic insulator (70, 82), the first member of filler material comprising at least a second metal (96a, 96b) wherein a first alloy system (Fig. 5) comprising the first and second metals includes an alloy minimum point percentage composition (P) of the first and second metals having a first point of the first metal and second metal. A bonding region resulting from heating the cathode assembly causing diffusion bonding to proceed, the bonding region has a layer of alloy comprising the minimum point percentage composition (P) and the heating of the cathode assembly continues to a bonding temperature of at least the first alloy system minimum melting point (M) and holding at that temperature for a desired period of time.



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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 224 143 A (EVAIN BERNARD ET AL) 29 June 1993 (1993-06-29) column 3, lines 58-60	23, 24, 28, 29
A	-----	1-22, 25-27, 30-34
Y	GB 2 049 522 A (ELLIOTT BROTHERS LONDON LTD) 31 December 1980 (1980-12-31) column 1, line 55 - column 2, line 20	23, 24, 28, 29
A	-----	1-22, 25-27, 30-34
A	GB 1 426 873 A (MULLARD LTD) 3 March 1976 (1976-03-03) page 2, lines 10-60 -----	1-34

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Patent document cited in search report	Publication date		Patent family member(s)		Publication date
US 5224143	A 29-06-1993	FR EP	2658002 A1 0440532 A1		09-08-1991 07-08-1991
GB 2049522	A 31-12-1980	DE EP	3066539 D1 0017384 A1		22-03-1984 15-10-1980
GB 1426873	A 03-03-1976	DE FR IT JP NL	2318727 A1 2183213 A1 984490 B 49048707 A 7305890 A		15-11-1973 14-12-1973 20-11-1974 11-05-1974 06-11-1973